

Claims

What is claimed is:

1. An optical device for measuring a distance between the optical device and an object, the optical device comprising:
 - an optical source for emitting beam of electromagnetic radiation;
 - a first lens for focusing the beam of electromagnetic radiation into a micro-mirror-incident pattern;
 - a micro-mirror array receiving the micro-mirror-incident pattern and outputting a controlled radiation pattern;
 - a processor for selecting the controlled radiation pattern based on at least one input; and
 - a second lens for focusing the controlled radiation pattern toward an object for estimation of a distance of the object from the optical device.
2. The optical device according to claim 1 wherein the micro-mirror array comprises a microelectromechanical system.
3. The optical device according to claim 1 wherein the micro-mirror array comprises an array of deformable surfaces and a controller for controlling the array to direct the controlled radiation pattern.
4. The optical device according to claim 1 wherein the controlled radiation pattern comprises at least one of a first pattern for scanning a field of view, a second pattern for covering a sample of the field of view, and a third pattern for covering a sub-area of the field of view.
5. The optical device according to claim 1 wherein the controlled radiation pattern has a beam size determined by reflective contributions from multiple mirrors of the micro-mirror array.
6. The optical device according to claim 1 wherein the controlled radiation pattern has a central beam that is steered gradually to a desired angular orientation without varying from the desired angular orientation by more than a maximum tolerance.
7. The optical device according to claim 1 wherein the optical source is a laser.
8. The optical device according to claim 1 further comprising:

a third lens for collecting a reflection of the electromagnetic radiation from the object;

a sensor for receiving the reflection and providing an output signal to the processor; and

a timer associated with the processor for determining an elapsed time between transmission of an electromagnetic radiation from the source and the reception of the reflection at the sensor, the elapsed time indicative of a distance between the optical device and the object.

9. The optical device according to claim 8 wherein a filter is interposed between the third lens and the sensor, the filter adapted to filter or reject at least one frequency of the reflected electromagnetic radiation.

10. An optical system for determining the range of an object, the optical system comprising:

an optical source of electromagnetic radiation,

a first transmitting lens for focusing or collimating the electromagnetic radiation;

a micro-mirror array for directing the focused electromagnetic radiation in a defined direction or pattern,

a second transmitting lens for focusing the electromagnetic radiation reflected from the micro-mirror array;

a processor is arranged to control the micro-mirror array to direct the focused radiation in the defined direction or pattern toward an object;

a receiving lens for receiving electromagnetic radiation reflected from the object,

a sensor for detecting the receipt of the reflected electromagnetic radiation;

a timer for determining an elapsed time between transmission of the electromagnetic radiation to the object and receipt of the electromagnetic radiation from the object;

a converter for converting the elapsed time into a distance between the object and the optical system.

11. A method for determining a distance of an object from a reference point, the

method comprising:

- emitting electromagnetic radiation;
- focusing the electromagnetic radiation upon a micro-mirror array;
- directing the focused electromagnetic radiation in a defined direction or defined radiation pattern toward an object;
- focusing the defined radiation pattern;
- receiving electromagnetic radiation reflected from the object;
- detecting the receipt of the reflected electromagnetic radiation;
- determining an elapsed time between transmission of the electromagnetic radiation to the object and receipt of the electromagnetic radiation from the object;

and

- converting the elapsed time into a distance between the object and the reference point.

12. The method according to claim 11 further comprising:

- filtering the electromagnetic radiation received from the energy source to control the intensity range of incident electromagnetic radiation upon a micro-mirror array.

13. The method according to claim 11 further comprising:

- filtering the electromagnetic radiation received from the energy source to control the intensity range of incident electromagnetic radiation upon the detector.